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File: JPAB

Oct 26, 1999

PUB-NO: JP411291715A

DOCUMENT-IDENTIFIER: JP 11291715 A

TITLE: MOTORCYCLE TIRE

PUBN-DATE: October 26, 1999

INVENTOR-INFORMATION:

NAME

COUNTRY

HARA, KENGO

ASSIGNEE-INFORMATION:

NAME

COUNTRY

SUMITOMO RUBBER IND LTD

APPL-NO: JP10094615

APPL-DATE: April 7, 1998

INT-CL (IPC): B60C 11/04; B60C 11/13

ABSTRACT:

PROBLEM TO BE SOLVED: To reduce heel-and-toe wear while exhibiting excellent wet and dry running performance by forming a slant groove nearly toward an external force.

SOLUTION: A motorcycle tire has slant grooves 10 continuously extending from a tire equator C side to a tread edge E1. A half tread surface is divided into three equal areas, that is, an inner area Yi, a middle area Ym, and an outer area Yo. To a reversal rotational circumferential direction line L0, an angle

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L1: Entry 2 of 2

File: DWPI

Feb 9, 2004

DERWENT-ACC-NO: 2000-027079

DERWENT-WEEK: 200413

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TITLE: Pneumatic tire for front wheel of two wheeled motor vehicles - has inclination grooves extended from tire equator to tread edge, consisting of specific inclined angles at respective divided areas of tread surface

PATENT-ASSIGNEE:

ASSIGNEE

SUMITOMO RUBBER IND LTD

CODE

SUMR

PRIORITY-DATA: 1998JP-0094615 (April 7, 1998)

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PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
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INT-CL (IPC): B60C 11/04; B60C 11/13

ABSTRACTED-PUB-NO: JP 11291715A

BASIC-ABSTRACT:

NOVELTY - Tread surface area (2S1) between tire equator and tread edge is divided into three equal areas such as inner area (Yi,Ym) and outer area (Yo) by boundary lines (L1,L2). Inclined angles (alpha 1- alpha 3) of groove at inner and outer areas with respect to peripheral line (L0) are 0 to +35, +32 to +100, +90 to +130 deg. respectively.

DETAILED DESCRIPTION - Multiple inclination grooves (10,10A,10B) are extended at both sides of tire equator (C), towards tread edge (E1). A line segment between start point of groove (K1) near tire equator and splice point (K2) at L0 is extended such that angle (beta 1) between line segment and L0 at inner area (Yi) is 0 to +30 deg. . A line segment is extended between splice point (K2) to splice

point (K3) such that angle (beta 2) between this line segment and L0 at inner area (Yo) is +20 to +80 deg. . The line segment from splice point (K3) to outer end point (K4) is extended so that angle (beta 3) between this line segment and L0 at outer area (Yo) is +80 to +150 deg. .

USE - For front wheel of two wheeled motor vehicle.

ADVANTAGE - The inclination grooves extended from tire equator line to tread edge, consisting of specific inclined angles at divided areas of tread surface ensures excellent runnability at wet and dry surfaces. The heal and toe abrasion of tire is suppressed.

DESCRIPTION OF DRAWING - The figure shows the expanded view of inclination groove in pneumatic tire. (10,10A,10B) Inclination grooves.

CHOSEN-DRAWING: Dwg.3/5

TITLE-TERMS: PNEUMATIC FRONT WHEEL TWO WHEEL MOTOR VEHICLE INCLINATION GROOVE
EXTEND EQUATOR TREAD EDGE CONSIST SPECIFIC INCLINE ANGLE RESPECTIVE DIVIDE AREA
TREAD SURFACE

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

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CPI Secondary Accession Numbers: C2000-007348

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【特許請求の範囲】

【請求項1】タイヤ子午断面におけるトレッド面がタイヤ赤道を中心としてトレッド縁に向かって凸円弧状をなす自動二輪車用タイヤであって、

タイヤ赤道側からトレッド縁に向かって連続してのびかつタイヤ赤道両側で周方向に隔置される複数の傾斜溝を設けるとともに、

タイヤ赤道とトレッド縁との間の半トレッド面を、第1、第2の周方向境界線によりタイヤ赤道側から内領域、中領域、外領域に3等分した前記内領域に位置する前記傾斜溝の内溝部分の主要部が反回転向き周方向線となす角度 $\alpha 1$ を $0 \sim +35$ 度、中領域に位置する中溝部分の主要部がなす角度 $\alpha 2$ を $+30 \sim +100$ 度、外領域に位置する外溝部分の主要部がなす角度 $\alpha 3$ を $+90 \sim +130$ 度としたことを特徴とする自動二輪車用タイヤ。

【請求項2】前記内溝部分のタイヤ赤道側の始端点と、内溝部分が中溝部分に連なる第1の継ぎ点との間の線分が反回転向き周方向線となす角度 $\beta 1$ を $0 \sim +30$ 度、前記第1の継ぎ点と、中溝部分が外溝部分に連なる第2の継ぎ点との間の線分がなす角度 $\beta 2$ を $+20 \sim +80$ 度、かつ前記第2の継ぎ点と、外溝部分の外端点との間の線分がなす角度 $\beta 3$ を $+80 \sim +150$ 度としたことを特徴とする請求項1記載の自動二輪車用タイヤ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、自動二輪車の前輪用タイヤとして好適に使用でき、優れたウェット走行性およびドライ走行性を発揮しながらトレッドショルダ部分における偏摩耗を抑制しうる自動二輪車用タイヤに関する。

【0002】

【従来の技術】車両の高出力化、高性能化に伴い、自動二輪車用タイヤにおいても高速度で安全走行しうる高性能タイヤが強く要求されており、そのためにトレッドパターンの改良も図られている。

【0003】このトレッドパターンの役割は、ウェット走行においてタイヤと路面との間の水を排出して路面との接地面積を確保することであり、そのために、自動二輪車の前輪には、図5に示すように、タイヤ赤道C側からトレッド縁E1側に向かって、タイヤの反回転方向Rに傾斜角度 θ を $0 \sim 90$ 度の範囲で増加しながらのびるハ字状の傾斜溝aを配したトレッドパターンが広く用いられている。

【0004】このパターンでは、傾斜溝aが、タイヤ回転時にその内端a1から順次接地するため、溝内の水がタイヤ赤道側から両外側（トレッド縁E1側）に向かって流水線に沿って効率よく排出されるため、排水効果に優れている。また直進あるいは大きな曲率半径の旋回に際して接地するトレッド中央部分では、傾斜溝aがタイ

ヤ周方向に対して浅い角度となるため周方向剛性が高い。しかも旋回時のキャンバー角とともに増加する横力に対応して傾斜溝aがタイヤ軸方向側に向くため、小さな旋回に際して接地するトレッドショルダ部分では横剛性が高くなる。その結果、ドライ走行においても優れた直進安定性および旋回性を発揮できる。

【0005】

【発明が解決しようとする課題】しかしながら、前輪用タイヤでは、後輪用タイヤと異なり駆動時、制動時の双方において常にタイヤ回転方向Fの転がり抵抗P1を受けるため、トレッドショルダ部分における傾斜溝aに所謂ヒール&トゥ摩耗bを発生し、旋回性能を早期に低下させるという問題がある。

【0006】なお、このヒール&トゥ摩耗bを抑制するために、例えば傾斜溝aの溝巾、溝深さを減じたり又溝壁面を緩傾斜とするなどしてトレッドショルダ部分でのパターン剛性を高めるなどの手法がとられるが、溝容積が減じ排水性能の低下を招くこととなる。

【0007】そこで本発明者が研究を重ねた結果、トレッドショルダ部分において実際に作用する外力Pは、旋回時の横力P2とタイヤ回転方向Fの前記転がり抵抗P1との合力であり、この外力Pに出来るだけ近い向きの傾斜溝aを形成することにより、外力Pに対する実質的な剛性が増し、ドライ走行における旋回性の向上とヒール&トゥ摩耗bの抑制とが達成されることを究明し得た。しかもこのものは、外力の向きに発生するトレッドのすべりが、溝内の水との相対的な動きを招くため、水が溝内を流れやすくなり排水性も向上されることが判明した。

【0008】すなわち本発明は、傾斜溝をトレッドショルダ部分において外力に近い向きで形成することを基本として、優れたウェット走行性およびドライ走行性を発揮しながらトレッドショルダ部分におけるヒール&トゥ摩耗を抑制しうる自動二輪車用タイヤの提供を目的としている。

【0009】

【課題を解決するための手段】前記目的を達成するために、本発明は、タイヤ子午断面におけるトレッド面がタイヤ赤道を中心としてトレッド縁に向かって凸円弧状をなす自動二輪車用タイヤであって、タイヤ赤道側からトレッド縁に向かって連続してのびかつタイヤ赤道両側で周方向に隔置される複数の傾斜溝を設けるとともに、タイヤ赤道とトレッド縁との間の半トレッド面を、第1、第2の周方向境界線によりタイヤ赤道側から内領域、中領域、外領域に3等分した前記内領域に位置する前記傾斜溝の内溝部分の主要部が反回転向き周方向線となす角度 $\alpha 1$ を $0 \sim +35$ 度、中領域に位置する中溝部分の主要部がなす角度 $\alpha 2$ を $+30 \sim +100$ 度、外領域に位置する外溝部分の主要部がなす角度 $\alpha 3$ を $+90 \sim +130$ 度としたことを特徴としている。

【0010】又前記内溝部分のタイヤ赤道側の始端点と、内溝部分が中溝部分に連なる第1の継ぎ点との間の線分が反回転向き周方向線となす角度 $\beta 1$ を $0 \sim +30$ 度、前記第1の継ぎ点と、中溝部分が外溝部分に連なる第2の継ぎ点との間の線分がなす角度 $\beta 2$ を $+20 \sim +80$ 度、かつ前記第2の継ぎ点と、外溝部分の外端点との間の線分がなす角度 $\beta 3$ を $+80 \sim +150$ 度とすることが、ウェット走行性、ドライ走行性、および耐ヒール&トゥ摩耗性のためにより好ましい。

【0011】

【発明の実施の形態】以下、本発明の実施の形態を、図示例とともに説明する。図1は、自動二輪車用タイヤ1（以下タイヤ1という）が前輪用タイヤである場合の子午断面を示す。

【0012】図においてタイヤ1は、トレッド部2と、その両端からタイヤ半径方向内方に向かってのびるサイドウォール部3と、各サイドウォール部3のタイヤ半径方向内方端に位置するビード部4とを有し、又前記ビード部4、4間に架け渡されるカーカス6と、このカーカス6の半径方向外側かつトレッド部2の内方に配されるベルト層7とによって、タイヤ強度及び剛性を高めている。

【0013】前記カーカス6は、トレッド部2からサイドウォール部3をへてビード部4のビードコア5に至るプライ本体の両側に、このビードコア5の廻りをタイヤ軸方向内側から外側に巻上げる巻上げ部を有し、このプライ本体と巻上げ部との間には、ビードコア5からタイヤ半径方向外側にのびるビードエーベックスゴム8を充填している。このカーカス6は、タイヤ周方向に対して $75 \sim 90$ 度の角度でカーカスコードをラジアル配列させた1枚以上、本例では1枚のカーカスプライ6Aからなり、その巻上げ部をトレッド縁E1近傍まで立ち上げたハイターンアップ構成とすることによって、前記ビードエーベックスゴム8とともにタイヤ横剛性を高めている。カーカスコードとしては、ナイロン、レーヨン、ポリエステル等の有機繊維コードが用いられる。

【0014】前記ベルト層7は、ベルトコードをタイヤ周方向に対して 30 度以下の小角度、本例では 20 度の角度で傾けて配列した2枚のベルトプライ7A、7Bから形成され、ベルトコードがプライ間で交差する強固なトラス構造となるようにベルトプライ7A、7Bの向きを互いに違えて配している。これによってトレッド部2の略全域をタガ効果を有して補強する。ベルトコードとしてナイロン、レーヨン、ポリエステル、芳香族ポリアミド等の有機繊維コード、特に高モジュラスの芳香族ポリアミド繊維コード等が好適に使用される。なおベルト層7としては、ベルトコードをタイヤ周方向に対して略 0 度の角度で、例えば螺旋巻きしたバラレルコードプライにより形成することもできる。

【0015】又前記トレッド部2は、タイヤ子午断面に

において、トレッド面2Sが、タイヤ赤道Cを中心として凸円弧状に湾曲してのび、かつトレッド縁E1、E1間のタイヤ軸方向の距離がタイヤ最大巾になるよう形成される。

【0016】またトレッド部2には、図2に示すように、タイヤ赤道C側からトレッド縁E1に向かって連続してのびかつタイヤ赤道Cの両側で周方向に隔壁される傾斜溝10を具えるトレッド溝が形成される。本例では、このトレッド溝が、タイヤ赤道C上を略直線状にのびかつ前記傾斜溝10とは非接触の縦溝11を有する場合を例示している。

【0017】また前記傾斜溝10は、本例では、主傾斜溝10Aと副傾斜溝10Bとから形成される。この主傾斜溝10Aは、タイヤ赤道Cとトレッド縁E1との間の半トレッド面2S1を、内領域Yi、中領域Ym、外領域Yoに3等分した時、該内領域Yi内に始端点K1を有して3つの前記領域Yi、Ym、Yoに延在する溝として定義され、前記傾斜溝10は、少なくともこの主傾斜溝10Aを含むことが必要である。なお前記副傾斜溝10Bは、本例では、前記中領域Ym内に始端点K1を有して2つの前記領域Ym、Yoに延在している。

【0018】ここで前記内領域Yi、中領域Ym、外領域Yoは、詳しくは、タイヤ赤道Cとトレッド縁E1との間のトレッド面2Sに沿うトレッド半巾TWの $1/3$ の距離を、タイヤ赤道Cからトレッド面2Sに沿って隔たる第1の周方向境界線L1と、 $2/3$ の距離をタイヤ赤道Cからトレッド面2Sに沿って隔たる第2の周方向境界線L2とによって、前記半トレッド面2S1を3等分した領域である。この内領域Yiは、直進走行の際に主に接地する巾領域であり、中領域Ymは、比較的大きい曲率半径のコーナを旋回走行する際に主に接地する巾領域を、また外領域Yoは、小さな曲率半径のコーナを大きなバンク角度で旋回走行する際に接地する領域を意味する。従来は、この外領域Yoに略相当するトレッドショルダ部分にヒール&トゥ摩耗が発生していた。

【0019】次に、タイヤ1は、図3に拡大して示すように、前記傾斜溝10のうち、前記内領域Yiに位置する内溝部分12の主要部12Mが反回転向き周方向線L0（タイヤの反回転方向Rにのびる周方向線を意味する）となす角度 $\alpha 1$ を $0 \sim +35$ 度、中領域Ymに位置する中溝部分13の主要部13Mがなす角度 $\alpha 2$ を $+30 \sim +100$ 度、外領域Yoに位置する外溝部分14の主要部14Mがなす角度 $\alpha 3$ を $+90 \sim +130$ 度、しかも各角度が $\alpha 3 > \alpha 2 > \alpha 1$ となるように規制している。

【0020】すなわち、内領域Yiでは、前記内溝部分12の主要部12Mが、タイヤ赤道C側からトレッド縁E1側に向かって反回転方向Rに傾斜したハ字状をなす。従って、タイヤ回転時、始端点K1から順次接地し、溝内の水をタイヤ赤道側から両外側に向かって流水

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線に沿って効率よく排水でき、高速走行が要求される直進時において優れたウェット走行性が発揮される。また角度 $\alpha 1$ が浅い角度となるため周方向剛性が高くドライ走行での直進安定性も高く維持される。

【0021】逆に、外領域Y_oでは、前記外溝部分14の主要部14Mが、タイヤ赤道C側からトレッド縁E1側に向かって回転方向Fに傾斜する。この傾斜方向は、前記外領域Y_oに作用する横力P2と転がり抵抗P1との合力(外力P)の向きに近似し、従って、この外力Pに対する剛性が増しその変形量を減じる結果、ドライ走行における旋回性の向上とヒール&トゥ摩耗の抑制とが達成される。また外力の向きに発生するトレッドのすべりが、溝内の水との相対的な動きを招くため、水が溝内を流れやすくなり排水性も向上される。

【0022】なお前記内溝部分12の主要部12Mでは、前記内領域Y_iに作用する外力の向きには、あえて近似させていないが、この内領域Y_iでは、前述の如く、角度 $\alpha 1$ が0〜35度と小であるため周方向剛性は、十分に確保されることとなる。また、もし内溝部分12を外溝部分14と同様、外力に近似させた場合には、剛性の向上効果がほとんど見込まれない反面、溝内の水がタイヤ赤道Cに向かって両外側から集中的に流れ込み、ウェット走行性を逆に損ねるなど、むしろ悪影響が大となってしまうからである。

【0023】また中領域Y_mでは、前記中溝部分13の主要部13Mが、前記内溝部分12と外溝部分14との中間の角度 $\alpha 2$ でのびるため、直進から深いバンク角度での旋回まで双方の利点を阻害することなく円滑に移行でき、全体として高い走行性能を発揮できる。

【0024】ここで、前記主要部12M、13M、14Mとは、各溝部分12、13、14のうちそれぞれの溝中心線に沿った溝長さの70%以上の範囲部分を意味する。また各溝部分12、13、14は、例えば円弧を連ねた曲線状、直線を連ねた屈曲線状、およびこれらを組み合わせ種々の形状に形成することができ、本例では、略直線を連ねた屈曲線状に形成した場合を例示している。なお曲線の場合には、前記角度 $\alpha 1$ 、 $\alpha 2$ 、 $\alpha 3$ は接線のなす角度として定義する。

【0025】前記角度 $\alpha 1$ が+35度を越えると、周方向剛性が不十分となりドライ走行での直進安定性を損ねかつウェット走行性(排水性)を低下する。また、前記角度 $\alpha 2$ が+30度より小の時および+100度より大の時、周方向剛性あるいは横剛性の一方が過小となりドライ走行での直進安定性あるいは旋回性を減じる他、直進から深いバンク角度での旋回まで円滑に移行できず操縦性を阻害する。また、前記角度 $\alpha 3$ が+90度より小の時および+130度より大の時、ヒール&トゥ摩耗を抑制しえずまた旋回性能を低下するとともに、特に+130度より大の時にはウェット走行性(排水性)も低下する。

【0026】なおウェット走行性、ドライ走行性、および耐ヒール&トゥ摩耗性のためには、図4に示すように、前記内溝部分12のタイヤ赤道側の始端点K1と、内溝部分12が中溝部分13に連なる第1の継ぎ点K2との間の線分が反回転向き周方向線L0となす角度 $\beta 1$ を0〜+30度、前記第1の継ぎ点K2と、中溝部分13が外溝部分14に連なる第2の継ぎ点K3との間の線分がなす角度 $\beta 2$ を+20〜+80度、かつ前記第2の継ぎ点K3と、外溝部分14の外端点K4との間の線分がなす角度 $\beta 3$ を+80〜+150度とすることが好ましい。

【0027】なお本例ではタイヤ赤道Cの一方側の傾斜溝10と他方側の傾斜溝10とは、図2に示すように、周方向ピッチTを略1/2ずらした千鳥状配列とするとともに、主傾斜溝10Aと副傾斜溝10Bとを交互に配置することにより傾斜溝10をトレッド全域に亘って均一に分散させている。

【0028】前記傾斜溝10としては他に、主傾斜溝10Aの始端点K1をタイヤ赤道C上、あるいはタイヤ赤道Cを越えて他方の内領域Y_iに位置させて延長しても良く、このとき延長部分がタイヤ赤道C付近の排水性を付与するために、縦溝11を削除しうる。

【0029】なお本願では、傾斜溝10の溝巾、溝深さ、溝断面形状等は特に規制されないが、従来タイヤのものが適宜採用できる。

【0030】またタイヤ1としては他に、前記カーカス6を、カーカスコードが30〜60度の角度で配列する2枚以上、例えば2枚のカーカスプライから形成したバイアス構造を採用することもでき、かかるバイアス構造の場合には、ベルト層7に代え、前記有機繊維のブレーカコードをカーカスプライと略同様の30〜60度程度の角度で配列した2枚以上、例えば2枚のプライからなるブレーカ層を設ける。

【0031】

【実施例】第1図に示す構造をなすタイヤサイズが110/70-17のタイヤを表1の仕様にに基づき試作するとともに、各試供タイヤのウェット走行性(排水性)、ドライ走行性および耐ヒール&トゥ摩耗性をそれぞれテストし、その結果を表1に記載した。各タイヤとも、表1以外の仕様、構造は全て同一である。

【0032】・ドライ走行性は、試供タイヤをリム(MT3.00×17)、内圧(220kpa)の条件下で自動二輪車(400cc)の前輪に装着し、乾燥したサーキットコースを略限界速度で実車走行し、ドライバーによる官能評価によって、直進安定性および旋回操縦性等を総合評価し、○(優)、△(可)、×(不可)の3段階で判定した。

・耐ヒール&トゥ摩耗性は、前記車両を用いて一周3.2kmの乾燥した周回コースを150周した後のヒール&トゥ摩耗の最大値を測定し、○(優)、△(可)、×

(不可)の3段階で判定した。

*評価によって、○(優)、△(可)、×(不可)の3段階で判定した。

・ウェット走行性(排水性)は、前記車両を用いて、路面上に散水した一周200mmのトラックコースを走行し、そのときの操縦性安定性等をドライバーによる官能*

【0033】

【表1】

	比較例1	比較例2	比較例3	比較例4	比較例5	実施例1
角度 α 1(度)	10	10	10	10	60	10
角度 α 2(度)	50	50	10	120	50	50
角度 α 3(度)	50	160	110	110	110	110
角度 β 1(度)	10	10	10	10	60	10
角度 β 2(度)	50	65	15	110	60	60
角度 β 3(度)	50	160	110	110	110	110
ウェット走行性(排水性)	△	△	△	△	×	○
ドライ走行性	×	×	△	△	×	○
耐ヒール&トゥ摩耗性	△	×	△	△	△	○

【0034】表1に示すように、実施例のタイヤは、各角度 α 1、 α 2、 α 3を所定範囲内に規制しているため、ウェット走行性(排水性)、ドライ走行性および耐ヒール&トゥ摩耗性をそれぞれ向上しうるのが確認できる。

【0035】

【発明の効果】本発明の自動二輪車用タイヤは、叙上の如く構成し傾斜溝を外力に近い向きで形成しているため、優れたウェット走行性およびドライ走行性を発揮しながらヒール&トゥ摩耗を抑制しうる。

【図面の簡単な説明】

【図1】本発明の一実施例の自動二輪車用タイヤを示す断面図である。

【図2】そのトレッドパターンを示す展開図である。

【図3】傾斜溝を説明する拡大図である。

【図4】傾斜溝の角度 β を説明する拡大図である。

【図5】従来タイヤのトレッドパターンの一例を示す展開図である。

【符号の説明】

2S トレッド面

※2S1 半トレッド面

10、10A、10B 傾斜溝

12 内溝部分の主要部

12M 内溝部分の主要部

13 中溝部分の主要部

13M 中溝部分の主要部

14 外溝部分の主要部

14M 外溝部分の主要部

10、10A、10B 傾斜溝

30 C タイヤ赤道

E1 トレッド縁

K1 始端点

K2 第1の継ぎ点

K3 第2の継ぎ点

K4 外端点

L0 反回転向き周方向線

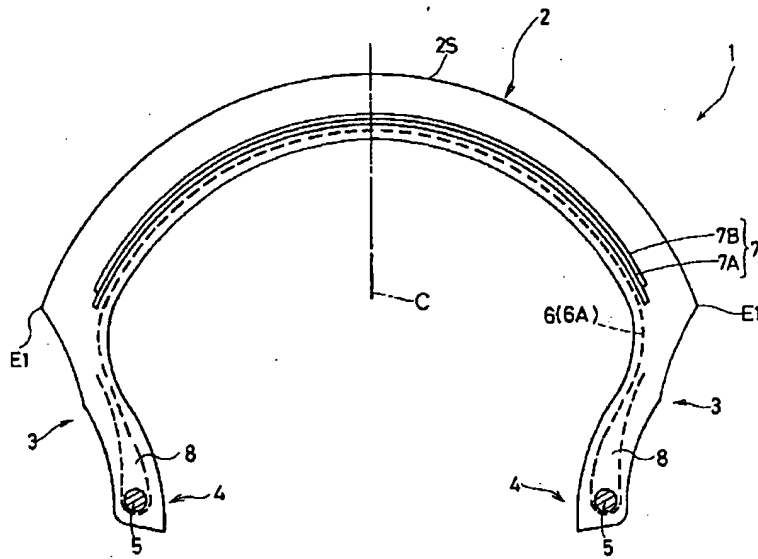
L1、L2 第1、第2の周方向境界線

Yc 内領域

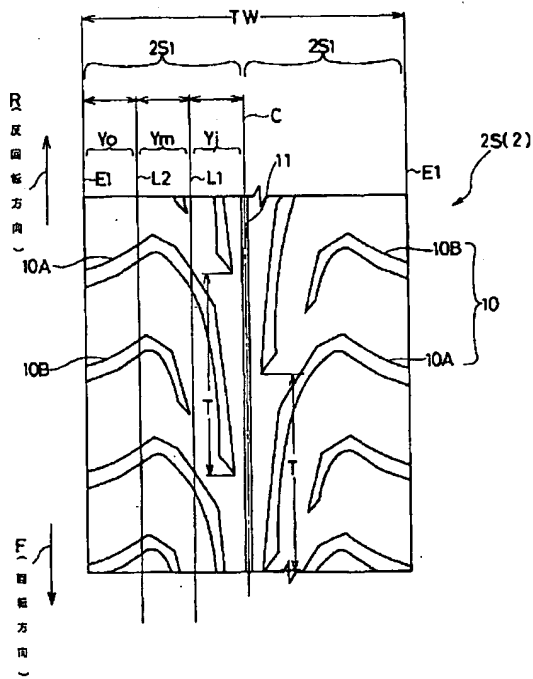
Ym 中領域

※40 Yo 外領域

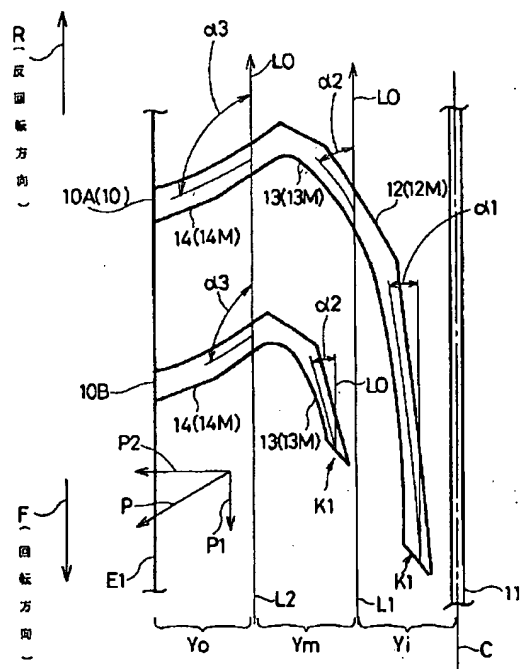
【図1】



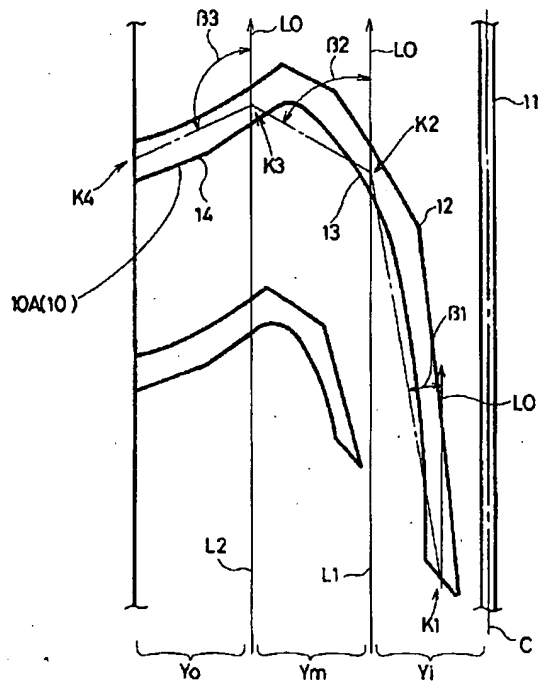
【図2】



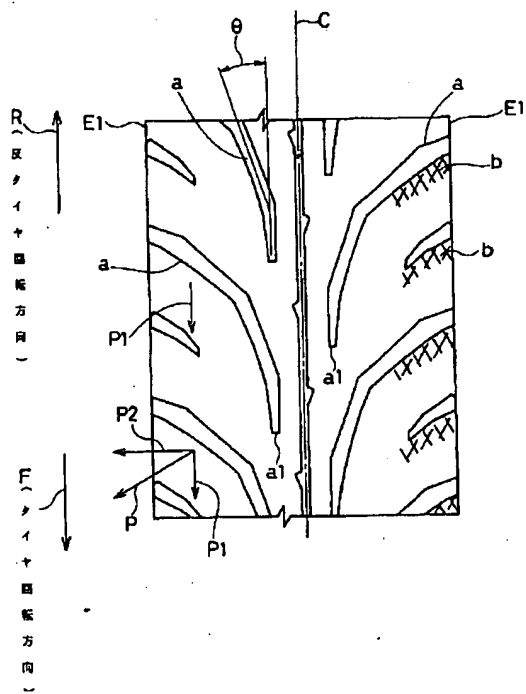
【図3】



【図4】



【図5】



* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention can be suitably used as a tire for front wheels of a motor bicycle, and it relates to the tire for motor bicycles which can control the partial wear in a tread shoulder part, demonstrating the outstanding wet performance traverse and dry performance traverse.

[0002]

[Description of the Prior Art] The high performance tire which can carry out insurance transit at high speed also in the tire for motor bicycles is strongly demanded with the high increase in power of a car, and high-performance-izing, therefore amelioration of a tread pattern is also achieved.

[0003] The role of this tread pattern is [therefore] discharging the water of Hazama of a tire and a road surface in wet transit, and securing a crawler bearing area with a road surface. For the front wheel of a motor bicycle The tread pattern which allotted the inclination slot a of the shape of a Ha character extended while increasing theta from the tire equator C side to the anti-hand of cut R of a tire by whenever [tilt-angle] in 0 - 90 degrees toward the tread edge E1 side, as shown in drawing 5 is used widely.

[0004] this pattern -- the inclination slot a -- the time of tire rotation -- in order [among those,] to carry out sequential touch-down from an edge a1 -- Mizouchi's water -- both the outsides (tread edge E1 side) from a tire equator side -- going -- a stream -- since it is efficiently discharged along with a line, it excels in the wastewater effectiveness. Moreover, since the inclination slot a serves as a shallow include angle to a tire hoop direction in the tread central part grounded on the occasion of revolution of rectilinear propagation or big radius of curvature, hoop direction rigidity is high. And since the inclination slot a turns to a tire shaft-orientations side with the camber angle at the time of revolution corresponding to the increasing lateral force, in the tread shoulder part grounded on the occasion of small revolution, horizontal rigidity becomes high. Consequently, the rectilinear-propagation stability and turnability which were excellent also in dry transit can be demonstrated.

[0005]

[Problem(s) to be Solved by the Invention] However, with the tire for front wheels, in order to always receive the rolling resistance P1 of the tire hand of cut F in the both sides at the time of braking at the time of a drive unlike the tire for rear wheels, the so-called heel & Thu wear b is generated into the inclination slot a in a tread shoulder part, and there is a problem of reducing turnability at an early stage.

[0006] In addition, although the flute width of the inclination slot a and a channel depth are reduced or technique, such as raising the pattern rigidity in a tread shoulder part by considering a groove face side as a gradual slope again, is taken in order to control this heel & Thu wear b for example, the slot volume will decrease and wastewater performance degradation will be caused.

[0007] As a result of this invention person's repeating research, then, the external force P which actually acts in a tread shoulder part By being resultant force with the lateral force P2 at the time of revolution, and said rolling resistance P1 of the tire hand of cut F, and forming the inclination slot a of the sense possible nearest to this external force P It could study that the improvement in turnability and the control

of the heel & Thu wear b in the increase of substantial rigidity over external force P and dry transit were attained. And it became clear that this thing became easy to flow the inside of a water fang furrow, and its wastewater nature also improved in order that the skid of the tread generated in the sense of external force may cause the relative motion by Mizouchi's water.

[0008] Namely, this invention aims at offer of the tire for motor bicycles which can control the heel & Thu wear in a tread shoulder part, demonstrating the wet performance traverse and dry performance traverse which were excellent on the basis of forming an inclination slot with the sense near external force in a tread shoulder part.

[0009]

[Means for Solving the Problem] In order to attain said purpose, this invention is a tire for motor bicycles into which the tread side in a tire meridional section makes the shape of convex radii toward a tread edge centering on the tire equator. While preparing two or more inclination slots continuously ****(ed) by the hoop direction on mileage and tire equatorial both sides toward a tread edge from a tire equator side The half-tread side of Hazama of the tire equator and a tread edge according to the 1st and 2nd hoop direction boundary line From a tire equator side to an inner field The principal part for a slot an anti-rotation sense hoop direction line and the include angle alpha 1 to make among said inclination slots located in an inside field and an outside field to said inner field equally divided into three 0 - +35 degrees, It is characterized by making into +90 - +130 degrees the include angle alpha 3 at which the principal part for the outside slot located in an outside field +30 to +100 degrees makes the include angle alpha 2 which the principal part for a slot makes while being located in an inside field.

[0010] The segment of Hazama of the start edge point by the side of the tire equator for said inside slot and the 1st splice point that the amount of inner slot stands in a row in a part for an inside slot an anti-rotation sense hoop direction line and the include angle beta 1 to make Moreover, the 0 - +30-degree, and 1st [said] splice point, The include angle beta 2 which the segment of Hazama with the 2nd splice point that the amount of inside slot stands in a row in a part for an outside slot makes The +20 - +80-degree, and 2nd [said] splice points, It is desirable to make into +80 - +150 degrees the include angle beta 3 which the segment of Hazama with the outer edge point for an outside slot makes because of wet performance traverse, dry performance traverse, and heel-proof & Thu abrasiveness.

[0011]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with the example of illustration. Drawing 1 shows a meridional section in case the tire 1 (henceforth a tire 1) for motor bicycles is a tire for front wheels.

[0012] In drawing, the tire 1 is raising tire reinforcement and rigidity by the carcass 6 over which has the tread section 2, the sidewall section 3 extended toward the method of the inside of tire radial from those both ends, and the toe of bead 4 located in the method edge of the inside of tire radial of each sidewall section 3, and it is built between said toe of bead 4 and 4, and the belt layer 7 allotted to a way among the radial outside of this carcass 6, and the tread section 2.

[0013] Said carcass 6 had the winding section which winds up the surroundings of this bead core 5 outside from the tire shaft-orientations inside on both sides of the ply body from the tread section 2 to the bead core 5 of a toe of bead 4 through the sidewall section 3, and has filled them up with bead APEC SUGOMU 8 which stretches from the bead core 5 on the tire radial outside between this ply body and the winding section. In one or more sheets which carried out the radial array of the carcass code at the include angle of 75 - 90 degrees to the tire hoop direction, and this example, this carcass 6 consists of carcass ply of one sheet 6A, and is raising tire horizontal rigidity with said bead APEC SUGOMU 8 by considering as the high turn rise configuration which started that winding section to about tread marginal E1. As a carcass code, organic fiber codes, such as nylon, rayon, and polyester, are used.

[0014] Said belt layer 7 was formed from the belt plies 7A and 7B of two sheets which leaned and arranged the belt at the include angle of 20 degrees by this example whenever [corniculus / of 30 or less degrees] to the tire hoop direction, and the sense of the belt plies 7A and 7B was changed mutually, and it has allotted it so that it may become the firm trussed structure which a belt intersects between plies. this -- the abbreviation whole region of the tread section 2 -- a hoop -- effectiveness is had and

reinforced. Organic fiber codes, such as nylon, rayon, polyester, and aromatic polyamide, especially the aromatic polyamide fiber code of a high modulus, etc. are suitably used as a belt. In addition, it can also form by the parallel code ply which is the include angle of zero abbreviation, for example, carried out the spiral volume of the belt to the tire hoop direction as a belt layer 7.

[0015] Moreover, in a tire meridional section, said tread section 2 is formed so that tread side 2S may curve in the shape of convex radii centering on the tire equator C and the distance of mileage and the tread edge E1, and the tire shaft orientations between E1 may become the tire maximum width.

[0016] Moreover, as shown in drawing 2, a tread groove equipped with the (inclination slot 10) continuously ****(ed) by the hoop direction on both sides of mileage and the tire equator C toward the tread edge E1 from the tire equator C side is formed in the tread section 2. In this example, this tread groove has illustrated the case where it has the (fluting 11) non-contact in mileage and said inclination slot 10 for the tire equator C top in the shape of an abbreviation straight line.

[0017] Moreover, said inclination slot 10 is formed by this example from (main inclination slot 10A) and (subinclination slot 10B) this main inclination slot 10A -- Hazama of the tire equator C and the tread edge E1 -- half-- tread side 2S1 When it divides into three equally to the inner field Yi, the inside field Ym, and the outside field Yo, it defines as a slot which has the start edge point K1 in this inner field Yi, and extends to said three fields Yi, Ym, and Yo, and said inclination slot 10 needs to include this main inclination slot 10A at least. In addition, in this example, said subinclination slot 10B had the start edge point K1 in said inside field Ym, and has extended to said two fields Ym and Yo.

[0018] Here said inner field Yi, the inside field Ym, and the outside field Yo The 1st hoop direction boundary line L1 which is far apart from the tire equator C along with tread side 2S in detail in one third in alignment with tread side 2S of Hazama of the tire equator C and the tread edge E1 of the distance of the tread half width TW, the 2nd hoop direction boundary line L2 which is far apart from the tire equator C along with tread side 2S in two thirds of distance -- said -- a half -- it is the field which divided tread side 2S1 into three equally. This (inner field Yi) is a width field mainly grounded in the case of rectilinear-propagation transit, and the inside field Ym means the field grounded in case the outside field Yo carries out revolution transit of the corner of small radius of curvature for the width field mainly grounded in case revolution transit of the corner of comparatively large radius of curvature is carried out by whenever [big angle of bank] again. Conventionally, heel & Thu wear had occurred into the tread shoulder part which carries out an abbreviation equivalent to the outside [this] field Yo.

[0019] So that a tire 1 may be expanded to drawing 3 and may be shown Next, the inside of said inclination slot 10, While it is located in said inner field Yi, (principal part 12M) for a (slot 12) the anti-rotation sense hoop direction line L0 (the hoop direction line extended in the anti-time turn direction R of a tire is meant), and the include (angle alpha 1) to make 0 - +35 degrees, +90 to +130 degrees, the include (angle alpha 3) at which (principal part 14M) for the (outside slot 14) located in the outside field Yo +30 to +100 degrees make the include (angle alpha 2) which principal part 13M for a slot 13 make while being located in the inside field Ym is regulated so that each include angle may moreover be set to alpha3>alpha2>alpha1

[0020] That is, in the inner field Yi, principal part 12M for said inside slot 12 make the shape of a Ha character which inclined in the anti-hand of cut R toward the tread edge E1 side from the tire equator C side. therefore, the time of tire rotation -- the sequential touch-down from the start edge point K1 -- carrying out -- Mizouchi's water -- both the outsides from a tire equator side -- going -- a stream -- along with a line, it can drain efficiently and the wet performance traverse which was excellent at the time of the rectilinear propagation as which high-speed transit is required is demonstrated. Moreover, since an include angle alpha 1 turns into a shallow include angle, hoop direction rigidity is high and the rectilinear-propagation stability in dry transit is also maintained highly. *

[0021] On the contrary, in the outside field Yo, principal part 14M for said outside slot 14 incline in a hand of cut F toward the tread edge E1 side from the tire equator C side. As a result of resembling the sense of resultant force (external force P), therefore the rigidity of this inclination direction over this external force P of the lateral force P2 and rolling resistance P1 which act on said outside field Yo increasing and reducing that deformation, the improvement in turnability and the control of heel & Thu *

wear in dry transit are attained. Moreover, in order that the skid of the tread generated in the sense of external force may cause the relative motion by Mizouchi's water, it becomes easy to flow the inside of a water fang furrow, and wastewater nature also improves.

[0022] In addition, although it is not made to dare resemble the sense of the external force which acts on said inner field Yi in principal part 12M for said inside slot 12, since include angles alpha 1 are 0 - 35 degrees, and smallness, in Field Yi, hoop direction rigidity will fully be secured like the above-mentioned. Moreover, when a part for the inner slot 12 is made to approximate to external force like a part for the outside slot 14, while the rigid improvement effectiveness is hardly expected, it is because a bad influence becomes size rather that Mizouchi's water flows in intensively from both outsides toward the tire equator C, and spoils wet performance traverse conversely etc.

[0023] Moreover, in the inside field Ym, since principal part 13M for said inside slot 13 are extended at an angle of [for a part for said inside slot 12 and the outside slot 14 / alpha 2] middle, it can shift smoothly, without checking both advantages from rectilinear propagation to revolution of whenever [deep angle of bank], and performance-traverse ability high as a whole can be demonstrated.

[0024] Here, 70% or more of range part of a flute length which met each slot center line among those for each slot 12, 13, and 14 is meant in said principal parts 12M, 13M, and 14M. Moreover, the amount of [12, 13, and 14] each slot could combine the shape of a curve which put radii in a row, the shape of coil gland which put the straight line in a row, and these, they could form them in various configurations, and have illustrated the case where it forms in the shape of [which put the abbreviation straight line in a row] coil gland, in this example. In addition, in the case of a curve, said include angles alpha1, alpha2, and alpha3 are defined as an include angle which a tangent makes.

[0025] If said include angle alpha 1 exceeds +35 degrees, hoop direction rigidity will become inadequate, and the rectilinear-propagation stability in dry transit will be spoiled, and wet performance traverse (wastewater nature) will be fallen. Moreover, from the time of smallness, and +100 degrees, at the adult time, said include angle alpha 2 becomes [too little / either a hoop direction rigid or horizontal rigid], reduces the rectilinear-propagation stability or turnability in dry transit, and also cannot shift smoothly from rectilinear propagation to revolution of whenever [deep angle of bank], but prevents controllability from +30 degrees. Moreover, while said include angle alpha 3 cannot control heel & Thu wear from the time of smallness, and +130 degrees at the adult time and falls turnability from +90 degrees again, at the adult time, wet performance traverse (wastewater nature) also falls especially from +130 degrees.

[0026] in addition, for wet performance traverse, dry performance traverse, and heel-proof & Thu abrasiveness As shown in drawing 4, the start edge point K1 by the side of the tire equator for said inside slot 12, The segment of Hazama with the 1st splice point K2 that the amount of [12] inner slot stands in a row in a part for the inside slot 13 the anti-rotation sense hoop direction line L0 and the include angle beta 1 to make The 0 - +30-degree, and 1st [said] splice point K2, It is desirable to make into +80 - +150 degrees the include angle beta 3 at which the segment of Hazama of the +20 - +80-degree and 2nd [said] splice points K3 and the outer edge point K4 for the outside slot 14 makes the include angle beta 2 which the segment of Hazama with the 2nd splice point K3 that the amount of [13] inside slot stands in a row in a part for the outside slot 14 makes.

[0027] In addition, while considering as the alternate array which shifted the hoop direction pitch T abbreviation 1 / 2 as the inclination slot 10 of the one side of the tire equator C, and the inclination slot 10 on the other side as shown in drawing 2, it continues throughout a tread and homogeneity is made to distribute the inclination slot 10 in this example by arranging main inclination slot 10A and subinclination slot 10B by turns.

[0028] A fluting 11 can be deleted, in order that the start edge point K1 of main inclination slot 10A may be located in the inner field Yi of the tire equator C top or another side beyond the tire equator C, and may otherwise be extended as said inclination slot 10 and an extension may give the wastewater nature near tire equatorial C at this time.

[0029] In addition, in this application, although the flute width of the inclination slot 10, a channel depth, especially a slot cross-section configuration, etc. are not regulated, the thing of a tire can adopt

them suitably conventionally.

[0030] Moreover, two or more sheets which otherwise arrange said carcass 6 as a tire 1 at the include angle whose carcass code is 30 - 60 degrees, The bias structure formed from the carcass ply of two sheets is also employable. For example, in the case of this bias structure It replaces with the belt layer 7 and the breaker layer which consists of ply of two or more sheets which arranged the breaker code of said organic fiber at the same include angle of about 30 - 60 degrees as carcass ply and abbreviation, for example, two sheets, is prepared.

[0031]

[Example] While the tire size which makes the structure shown in Fig. 1 made the tire of 110 / 70-17 as an experiment based on the specification of Table 1, the wet performance traverse (wastewater nature) of each sample offer tire, dry performance traverse, and heel-proof & Thu abrasiveness were tested, respectively, and the result was indicated to Table 1. All of specifications other than table 1 and structure are the same as that also of each tire.

[0032] - Dry performance traverse equipped the front wheel of a motor bicycle (400 cc) with the sample offer tire under a rim (MT 3.00x17) and the conditions of internal pressure (220kpa), carried out real vehicle transit of the dry circuit course with abbreviation critical speed, by organic-functions evaluation by the driver, carried out comprehensive evaluation of rectilinear-propagation stability, the revolution controllability, etc., and judged them by the three-stage of O (A), ** (good), and x (improper).

- Heel-proof & Thu abrasiveness measured the maximum of the heel & Thu wear after carrying out the dry circumference course of 3.2km of round 150 round using said car, and judged it by the three-stage of O (A), ** (good), and x (improper).

- Wet performance traverse (wastewater nature) ran the truck course of 200mm of round which sprinkled on the road surface using said car, and judged the controllability stability at that time etc. by the three-stage of O (A), ** (good), and x (improper) by organic-functions evaluation by the driver.

[0033]

[Table 1]

	比較例 1	比較例 2	比較例 3	比較例 4	比較例 5	実施例 1
角度 $\alpha 1$ (度)	10	10	10	10	60	10
角度 $\alpha 2$ (度)	50	50	10	120	50	50
角度 $\alpha 3$ (度)	50	160	110	110	110	110
角度 $\beta 1$ (度)	10	10	10	10	60	10
角度 $\beta 2$ (度)	50	65	15	110	60	60
角度 $\beta 3$ (度)	50	160	110	110	110	110
ウェット走行性 (排水性)	Δ	Δ	Δ	Δ	\times	\bigcirc
ドライ走行性	\times	\times	Δ	Δ	\times	\bigcirc
耐ヒール&トゥ摩耗性	Δ	\times	Δ	Δ	Δ	\bigcirc

[0034] As shown in Table 1, since the tire of an example has regulated each include angles alpha1, alpha2, and alpha3 to predetermined within the limits, it can check that wet performance traverse (wastewater nature), dry performance traverse, and heel-proof & Thu abrasiveness may be improved, respectively.

[0035]

[Effect of the Invention] Since the tire for motor bicycles of this invention is constituted like the above statement and forms the inclination slot with the sense near external force, it can control heel & Thu

wear, demonstrating the outstanding wet performance traverse and dry performance traverse.

[Translation done.]

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The tread side in a tire meridional section is the tire for motor bicycles which makes the shape of convex radii toward a tread edge centering on the tire equator. While preparing two or more inclination slots continuously ****(ed) by the hoop direction on mileage and tire equatorial both sides toward a tread edge from a tire equator side The half-tread side of Hazama of the tire equator and a tread edge according to the 1st and 2nd hoop direction boundary line From a tire equator side to an inner field The principal part for a slot an anti-rotation sense hoop direction line and the include angle alpha 1 to make among said inclination slots located in an inside field and an outside field to said inner field equally divided into three 0 - +35 degrees, The tire for motor bicycles characterized by making into +90 - +130 degrees the include angle alpha 3 at which the principal part for the outside slot located in an outside field +30 to +100 degrees makes the include angle alpha 2 which the principal part for a slot makes while being located in an inside field.

[Claim 2] The segment of Hazama of the start edge point by the side of the tire equator for said inside slot and the 1st splice point that the amount of inner slot stands in a row in a part for an inside slot an anti-rotation sense hoop direction line and the include angle beta 1 to make The 0 - +30-degree, and 1st [said] splice point, The tire for motor bicycles according to claim 1 characterized by making into +80 - +150 degrees the include angle beta 3 at which the segment of Hazama of the +20 - +80-degree and 2nd [said] splice points and the outer edge point for an outside slot makes the include angle beta 2 which the segment of Hazama with the 2nd splice point that the amount of inside slot stands in a row in a part for an outside slot makes.

[Translation done.]